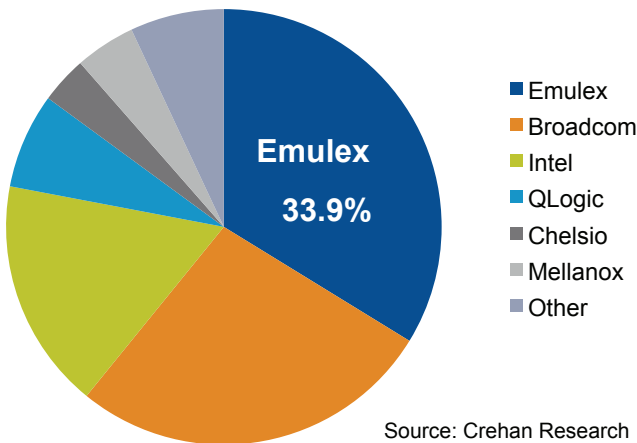


Emulex OCe11102 vs. Intel X520 10 Gigabit Ethernet Adapters

The OneConnect™ OCe11102 product family is the third generation of Emulex 10GbE server adapters. With the transition to 10GbE networking gaining momentum, Emulex has emerged as the leader in total 10GbE ports shipped based on a broad portfolio of adapters for rack-mount and blade servers, and LAN-on-motherboard (LOM) controllers.

Total 10GbE Ports Shipped – Q3 2011



This competitive brief highlights key advantages that Emulex OneConnect OCe11102 10GbE server adapters provide when compared to Intel X520 adapters.

Broadest Portfolio of Adapters

Emulex OneConnect adapters have been qualified by nine of the top ten server and storage providers. This includes stand-up adapters for rack-mount servers and custom form factor adapters for blade servers manufactured by HP, IBM, Dell, Cisco and Fujitsu Technology Solutions. OneConnect adapters are also included as LOMs for high-performance servers from HP and IBM.

As a result, data centers can standardize on OneConnect adapters across a wide range of servers from multiple sources. By enabling a single framework for all 10GbE connectivity, OneConnect simplifies version management and testing by supporting:

- Common NIC drivers
- Common firmware and boot code
- Consistent NIC teaming

At a Glance

Data Centers have many choices for 10 Gigabit Ethernet (10GbE) server adapters. This competitive brief compares Emulex OneConnect OCe11102 10GbE server adapters with Intel X520 adapters.

Key advantages for OCe11102 adapters include:

- Broad family of adapters for blade and rack-mount servers allows data centers to standardize with common drivers, teaming and boot code
- Hardware iSCSI that minimizes use of CPU resources and enables I/O for 50% more virtual machines
- Full protocol offload for Fibre Channel over Ethernet based on ten generations of field-proven Fibre Channel products
- Universal Multi-Channel NIC partitioning to fully optimize 10GbE bandwidth
- OneCommand™ Manager supports network and storage connectivity throughout the data center from a single management console



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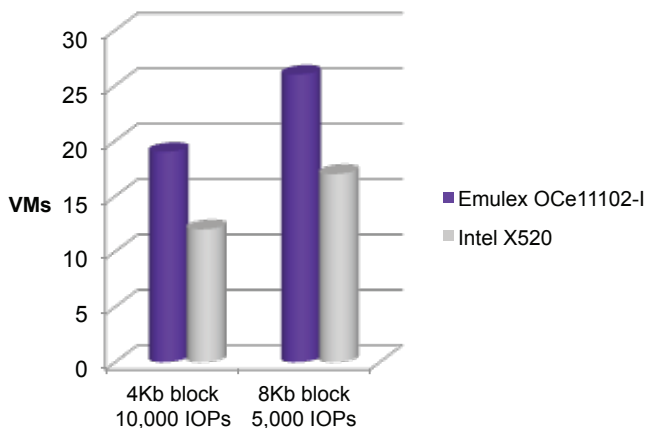
Hardware iSCSI

OneConnect OCe11102-I adapters support iSCSI storage connectivity with full protocol offload and acceleration for iSCSI, TCP Offload Engine (TOE) and TCP/IP processing. Intel X520 adapters rely on software initiators that use CPU resources for I/O processing that can reduce virtualization ratios and slow compute-intensive applications.

OneConnect iSCSI adapters also use a separate software stack that optimizes performance for operating systems and hypervisors. In contrast, Intel adapters rely on the TCP software stack that's used for all network traffic, creating the potential for bottlenecks and contention for server resources.

The performance benefits of a hardware iSCSI adapter are particularly critical to optimize virtual servers deployments. To help quantify this benefit, Emulex Labs conducted a series of benchmark tests evaluating the maximum number of virtual machines (VMs) that could run concurrently with a constant I/O rate. The maximum number of VMs was reached when the iSCSI I/O rate dropped below 10,000 I/Os per second (IOPS) for 4Kb block sizes and 5000 IOPS for 8Kb block sizes. Tests were done with the Emulex OCe11102-I iSCSI hardware adapter vs. the Intel X520 and Windows Server 2008 iSCSI software initiator.

Tests showed Emulex OCe11102-I iSCSI adapters support 58% more VMs using a 4Kb block size and 53% more VMs with an 8Kb block size.



Hardware FCoE

Data centers have traditionally used separate infrastructures for networking and Fibre Channel storage. Deploying multiple networks has led to increased capital expenses for adapters, switch ports and cables, and increased operational costs for power, cooling and management.

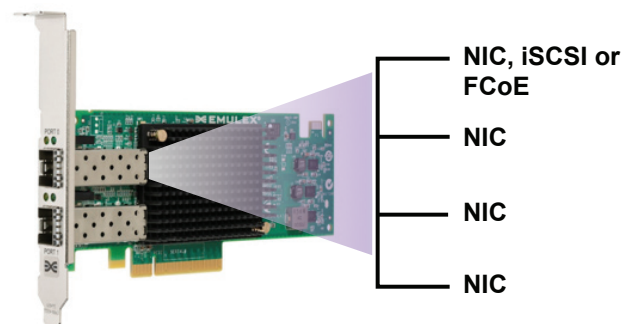
Fibre Channel over Ethernet (FCoE) is an IEEE standards-based technology to encapsulate Fibre Channel packets within Ethernet frames, allowing Fibre Channel traffic to be supported on the same physical infrastructure that's used for networking.

Emulex OneConnect OCe11102-F adapters supports FCoE with full protocol offload and acceleration using the same drivers that work with Emulex LightPulse® Fibre Channel Host Bus Adapters (HBAs), providing two critical benefits:

- **Proven software stack**—The Emulex Fibre Channel software stack has matured with ten product generations and shipment of over 11 million ports. It's a trusted technology that is widely deployed for business critical applications. Intel support is based on the Open FCoE software stack that lacks the multi-generation, battle-tested pedigree that data centers demand for enterprise-class deployments.
- **CPU efficiency**— Emulex OCe11102-F adapters support CPU offload for FCoE processing, providing optimum server efficiency. The Intel/Open FCoE approach uses CPU cycles that could support higher server virtualization ratios and compute-intensive applications.

Universal Multi-Channel

Emulex OneConnect OCe11102 adapters support NIC partitioning with the switch-agnostic Universal Multi-Channel (UMC) capability that is based on the IEEE 802.1Qbg standard. With UMC, four NIC functions can be created on each adapter port and presented to an operating system or hypervisor with a unique MAC address. With adapters that support network storage, one of the NIC functions is replaced with an FCoE or iSCSI function.





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UMC is ideally suited for a virtualized server where two 10GbE ports could be used to replace 6-8 1GbE NIC ports. With UMC, bandwidth can be allocated for high-demand VMs, cluster support, VM migration and system management.

The Intel X520 provides no equivalent capability.

Enterprise Management

The Emulex OneCommand Manager application enables management of Emulex OneConnect 10GbE adapters and LightPulse HBAs throughout the data center from a centralized console. Administrators can manage high-performance connections for networking, FCoE and iSCSI with a single view of the entire network.

The OneCommand Manager application provides a graphical user interface (GUI) and a scriptable command line user interface (CLI). In-depth management capabilities include remote firmware and boot code upgrades, beaconing, statistics and advanced diagnostics. OneCommand Manager for VMware vCenter is ideally suited for virtual server deployments that have been a key market for 10GbE networking.

In contrast, Intel X520 adapters rely on adapter management in the native operating system. Management must be done locally on the server and will be different for each operating system.

Conclusion

As shown in the following table, OCe11102 adapters provide many key advantages when compared with Intel X520 adapters.

| | Emulex OCe11102 | Intel X520 |
|--------------------------------|-----------------|------------|
| Market leader in ports shipped | • | |
| Broad portfolio | • | |
| Stateless TCP/IP offload | • | • |
| iSCSI offload | • | |
| FCoE offload | • | |
| Universal Multi-Channel | • | |
| Enterprise management | • | |

The combination of superior performance and centralized management make OneConnect the best choice for 10GbE deployments.

OneConnect Ordering Information

| Interconnect | NIC | NIC + iSCSI | NIC + iSCSI + FCoE |
|----------------------|-------------|-------------|--------------------|
| Direct Attach Copper | OCe11102-NX | OCe11102-IX | OCe11102-FX |
| Optical | OCe11102-NM | OCe11102-IM | OCe11102-FM |



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